

REMARKS

In the Action of October 6, 2008, in paragraph 2, claims 5, 11 and 15 were rejected under 35 U.S.C. 112, second paragraph. Further, in paragraph 4 of the Action, claims 5, 11 and 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hrivnak et al. (USPN 4388356) in view of Myers et al. (USPN 4239727).

In response to the rejections asserted in the Action, claim 15 has been amended to further clarify the feature of the invention. Also, new claim 16 has been filed.

Claim 15 now recites the clamping step as clamping the orifice portion or the flange portion of the cup-shaped vessel for forming a clamped portion. Therefore, the rejections under 35 U.S.C. 112, second paragraph should be withdrawn.

With respect to the obviousness rejection, as recited in claim 15 of the present invention, a method for manufacturing a thermoplastic resin vessel, comprises the steps of:

- 1) fixing a thermoplastic resin sheet outside a forming portion of a cup-shaped vessel at a fixing position of the thermoplastic resin sheet;

- 2) pre-forming an inner portion of the thermoplastic resin sheet relative to the fixing position by a plug, wherein a portion corresponding to an orifice portion or a flange portion of the cup-shaped vessel is drawn;

- 3) clamping a portion corresponding to the orifice portion or the flange portion of the cup-shaped vessel at a clamping position;

- 4) drawing an inner portion of the thermoplastic resin sheet relative to the clamping position further by the plug;

- 5) pneumatically forming a drawn thermoplastic resin sheet into a shape of a lower mold heated at not less than a crystallization temperature of the thermoplastic resin sheet, and thermally fixing the sheet; and

6) decompressing an inside of a formed article to contract the formed article into a shape of the plug which is a final vessel shape, and cooling the article.

The steps 1) to 3) of the present invention relate to a process for forming the orifice portion of the cup-shaped vessel and the flange portion thereof. The steps 3) to 6) relate to a process for forming lateral portion and bottom portion of the cup-shaped vessel.

Namely, when the lateral portion and the bottom portion are formed by pushing the clamped sheet, a formed article including the bottom portion thereof is entirely drawn so as to have the oriented crystallization. By subsequent thermal fixing by means of a heated lower mold, the oriented crystallization is further facilitated so that the heat resistance and mechanical strength are obtained while transparency is maintained throughout the entire formed article including the bottom portion.

However, unlike the present invention, Hrivnak discloses a method comprising:

- 1) drawing an unclamped resin sheet by a plug;
- 2) clamping the drawn resin sheet;
- 3) pneumatically forming the resin sheet into a shape of a heated lower mold; and
- 4) decompressing an inside of a formed article to contract the formed article into a shape of the plug which is a final vessel shape, and cooling the article.

The steps 1), 2) and 4) relate to the process for forming lateral portion and bottom portion of the cup-shaped vessel.

The step 2) relates to the process for forming the orifice portion of the cup-shaped vessel and the flange portion thereof.

In comparing the present invention, when the lateral portion and the bottom portion are formed, since the plug pushes the unclamped sheet, the unclamped sheet can not be sufficiently pushed

by the plug. A formed article cannot be entirely drawn. In other words, the bottom portion of the formed article cannot be drawn even though the lateral portion thereof may be drawn. Accordingly, by the subsequent thermal fixing by means of a heated lower mold, the lateral portion can obtain the oriented crystallization as well as heat resistance and mechanical strength while a transparency is maintained. However, the bottom portion cannot be sufficiently drawn thereby causing embrittlement and whitening as well as spherocrystallization. Therefore, the process disclosed in Hrivnak provides the heat resistance, but not the transparency or mechanical strength. Hence, the present invention is significantly different from Hrivnak, and accordingly, final product is also significantly different in terms of the mechanical characteristics.

Further, with respect to Myers, the method for thermoforming plastic foam articles comprises:

- 1) fixing a thermoplastic resin sheet outside a forming portion of a cut-shaped vessel for forming a fixed portion of the thermoplastic resin sheet;

- 2) pre-forming an inner portion of the fixed portion by a plug, wherein a portion corresponding to an orifice portion or a flange portion of the cup-shaped vessel is drawn;

- 3) drawing an unclamped portion further by the plug;

- 4) pneumatically forming a drawn thermoplastic resin sheet into a shape of a female mold;

- 5) clamping the pneumatically formed resin sheet; and

- 6) cooling the article and finalizing its shape between the male and female molds.

The steps 1)-4), and 6) relate to the process for forming lateral portion and bottom portion of the cup-shaped vessel.

The step 5) relates to the process for forming the orifice portion of the cup-shaped vessel and the flange portion thereof.

Namely, unlike the present invention, when the lateral portion and the bottom portion of the article are formed, the plug is pushed into the unclamped sheet. Therefore, the method in the present invention is significantly different from that of Myers, and accordingly, the final product is also significantly different between the present invention and Myers in terms of mechanical characteristics.

The Examiner held that Hrivnak discloses the process disclosed in the present invention except for the step of fixing a thermoplastic resin sheet outside a forming portion of a cut-shaped vessel, and that Myers discloses the step of fixing a thermoplastic resin sheet outside a forming portion of a cut-shaped vessel and the step of thermal-forming the fixed thermoplastic sheet.

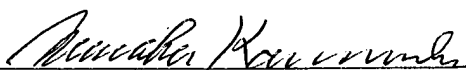
However, both of the cited references do not disclose that after fixing a thermoplastic resin sheet outside a forming portion of a cut-shaped vessel at a fixing position of the thermoplastic resin sheet, an inner portion of the thermoplastic resin sheet relative to the fixing position is preformed by a plug, wherein a portion corresponding to an orifice portion or a flange portion of the cup-shaped vessel is drawn; and after clamping a portion corresponding to the orifice portion or the flange portion of the cup-shaped vessel at a clamping position, an inner portion of the thermoplastic resin sheet relative to the clamping position is further drawn by the plug;

The step of drawing the clamped portion further by the plug is very critical in a sense such that the step plays an essential role to cause the oriented crystallization throughout the formed article including the bottom portion thereof, thereby further obtaining the heat resistance and the mechanical resistance while the final product still maintains the transparency throughout the formed article including the bottom portion thereof.

Therefore, the cited references, even if combined, cannot make the prima facie obviousness over claim 15, and claim 15 and all pending claims depending from claim 15 should be patentable over the cited references.

Reconsideration and allowance are earnestly solicited.

Respectfully Submitted,

By 
Manabu Kanesaka
Reg. No. 31,467
Agent for Applicants

1700 Diagonal Road, Suite 310
Alexandria, VA 22314
(703) 519-9785